Trend Study 16C-40-04

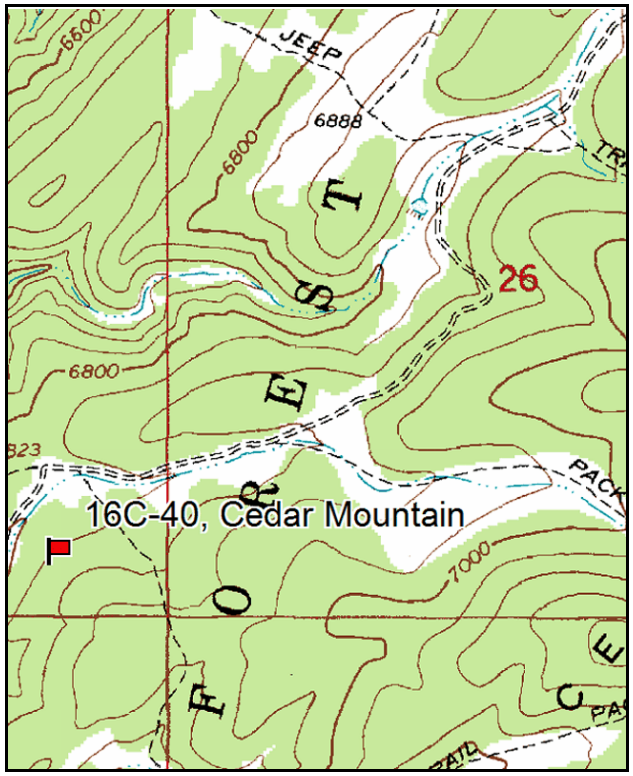
Study site name: Cedar Mountain . Vegetation type: Chained, Seeded, PJ .

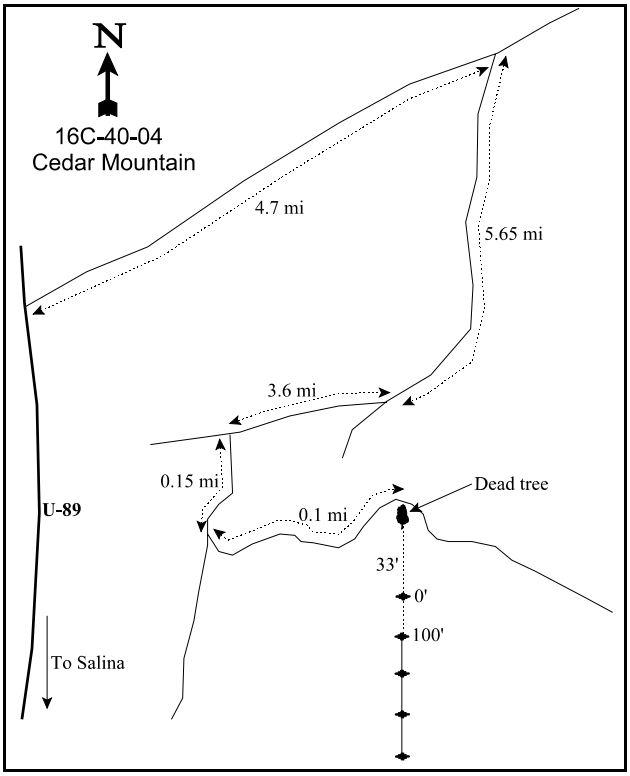
Compass bearing: frequency baseline 180 degrees magnetic.

Frequency belt placement: line 1 (11 & 95), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From mile marker 198 on U-89 north of Salina, take the Willow Creek Road east for 4.7 miles to a fork near a reservoir. Turn right and go south along the dike. Continue on this road for 5.65 miles up switchbacks to the top of the hill and southwest along the top until the road forks. Take the right fork through some oak and juniper and across a chained area, staying on the main road for 3.6 miles until coming to a fork. Turn left and proceed down the bottom of the draw 0.15 miles southwest to another fork. Turn left and go uphill 0.1 miles to the second bend to the right. The frequency baseline starts 33 feet south of the road beyond a large dead tree. The transect is marked by rebar approximately 2 feet tall. The 0-foot baseline stake has a red browse tag number 7039 attached.





Map Name: Salina, Utah

Diagrammatic Sketch

Township 21S , Range 1E , Section 27

GPS: NAD 27, UTM 12S 4310983 N, 432580 E

DISCUSSION

Cedar Mountain - Trend Study No. 16C-40

The Cedar Mountain study is located on a high plateau east of Salina. Elevation is 6,800 feet with a west aspect and a 15% slope. The area was chained in 1979-80 and seeded with a mixture of grasses, forbs, and browse species by the Forest Service. These juniper-pinyon slopes were heavily grazed by domestic sheep in the past. Since the chaining, there has been no grazing and the grasses have responded with good forage production. Pellet group data from 1999 estimate only 10 deer and 34 elk days use/acre (25 ddu/ha, 84 edu/ha). Rabbit pellets are common. Most of the elk pellet groups were from early spring. Pellet group data from 2004 estimate 4 deer, and 37 elk days use/acre (10 ddu/ha and 93 edu/ha). Elk use was from previous winter. Good hiding and thermal cover exists in the unchained draw bottoms and islands of pinyon-juniper trees.

The soil is productive and relatively deep. Effective rooting depth is estimated at just over 14 inches. Soil texture is a clay loam with a slightly alkaline pH (7.6). Percent organic matter is relatively high at 5.4%, but phosphorus is limited at only 5.1 ppm. Values for phosphorus less than 10 ppm can limit normal plant growth and development. Erosion is minimal due to a vigorous stand of sod-forming perennial grasses and an abundance of litter from chaining is also common and well distributed.

There are few browse species present. Mature juniper and pinyon, averaging 8 to 12 feet in height, dominate the site by providing basically all of the browse cover. They are vigorous, producing seeds, and are not utilized. Point quarter data from 1999 estimate 44 pinyon and 90 juniper trees/acre and 2004 estimated 46 pinyon and 84 juniper trees/acre. Average diameter of pinyon in 1999 was 3.7 inches and juniper was 4.8 inches. In 2004 average diameter was 3.4 inches for pinyon and 4.5 for juniper. About 15% of the juniper trees in 1999 were tipped-over trees and still living, while only 5% in 2004. There are a few black sagebrush, rabbitbrush, and Gambel oak on the site which all display light use except black sagebrush had moderate use in 2004. Nearby, some mature mountain big sagebrush and mountain mahogany also have survived the chaining. These plants are also vigorous and only lightly browsed. Big sagebrush, bitterbrush, and fourwing saltbush were supposedly seeded, but no established plants were observed.

Grasses dominant the site by providing 71% of the total vegetative cover in 1999 and 68% in 2004. Intermediate wheatgrass is the most abundant and it produces 61% of the grass cover in 1999 and 64% in 2004. Other abundant grasses are smooth brome and crested wheatgrass. There are a few other grass species present, although they occur in very small numbers. Forbs are scarce. Alfalfa and small burnet were not found on the transect in 1985 or 1991, but a few were observed nearby indicating spotty establishment of forbs. Some alfalfa was encountered in 1999.

1985 APPARENT TREND ASSESSMENT

The soil has stabilized and trend appears upward for herbaceous species since the chaining. The seeding was successful in establishing a vigorous stand of grasses. Big game use could be enhanced by interseeding more browse and forb species.

1991 TREND ASSESSMENT

The data indicates a continued upward trend for the herbaceous species. Intermediate wheatgrass, crested wheatgrass, and smooth brome have the following quadrat frequency values; 91%, 51%, and 52%. Shrubs are still in very low numbers, but will increase in time. The soil trend is stable.

TREND ASSESSMENT
soil - stable (3)
browse - up (5)
herbaceous understory - up (5)

1999 TREND ASSESSMENT

Trend for soil is considered stable. Percent cover of bare ground has declined from 18% to 10%, however litter cover has also declined. Overall, erosion is minimal. Trend for browse is stable but useful shrubs are nearly absent on the site. The only common browse are released pinyon and juniper trees which are currently about 8 to 10 foot tall. There are only a few black sagebrush and Gambel oak sampled on the site. Shrubs will never be abundant on the site unless they are seeded or planted. Pinyon and juniper trees will continue to increase in size and density until they regain dominance. The abundant herbaceous understory will slow this transition, but the only thing that will reverse it is a burn or some other treatment to control the trees. Trend for the herbaceous understory is stable. Sum of nested frequency for perennial grasses is down slightly. The most abundant species, crested and intermediate wheatgrass, and smooth brome, have remained at similar levels compared to 1991. Forbs are lacking and have declined in sum of nested frequency. Some seeded alfalfa was encountered. The more abundant species are annuals or low value, low growing species. The Desirable Components Index (see methods) rated this site as fair with a score of 27 due to minimal shrub cover, few young shrubs, but good grass cover.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - stable (3)
winter range condition (DC Index) - 27 (fair) Black sagebrush - chaining type

2004 TREND ASSESSMENT

Trend for soil is down. Percent relative cover of bare ground increased from 10% in 1999 to 28% in 2004. The amount of protective cover has decreased and rock and pavement cover has increased suggesting continued erosion. Trend for browse species is stable. No key browse species really exist on this site. A few black sagebrush have moderate use and percent decadence has increase from 0% in 1999 to 67% in 2004, but otherwise pinyon and juniper dominate this site. Pinyon and juniper trees will continue to increase in size and density until they regain dominance. The abundant herbaceous understory will slow this transition, but the only thing that will reverse it is a burn or some other treatment to control the trees. Trend for herbaceous understory is down slightly. Sum of nested frequency of grasses has decreased while cover has remained relatively the same. Both crested wheatgrass and smooth brome decreased significantly in nested frequency. Forbs are fairly diverse, but so minimal that they contribute very little to vegetation cover. The Desirable Components Index rated this site as fair with a score of 30 due to minimal shrub cover, no young shrubs, but good grass cover.

TREND ASSESSMENT
soil - down (1)
browse - stable (3)
herbaceous understory - down slightly (2)
winter range condition (DC Index) - 30 (fair) Black sagebrush - chaining type

HERBACEOUS TRENDS --
Management unit 16C, Study no: 40

Type	Species	Nested Frequency				Average Cover %	
		'85	'91	'99	'04	'99	'04
G	Agropyron cristatum	$_{b}$111	$_{b}$116	$_{b}$144	$_{a}$63	3.20	2.65
G	Agropyron intermedium	248	274	235	255	7.69	9.14
G	Agropyron spicatum	$_{a}$-	$_{b}$34	$_{a}$8	$_{a}$2	.21	.38
G	Bromus inermis	$_{ab}$113	$_{bc}$137	$_{c}$161	$_{a}$90	1.31	1.72
G	Elymus junceus	-	1	2	-	.03	.00
G	Elymus salina	3	-	-	-	-	-
G	Festuca ovina	4	-	-	-	-	-
G	Hordeum jubatum jubatum	6	-	-	-	-	-
G	Koeleria cristata	$_{b}$7	$_{a}$-	$_{a}$-	$_{a}$-	.00	-
G	Oryzopsis hymenoides	6	6	-	-	-	-
G	Poa fendleriana	-	2	7	5	.02	.18
G	Poa secunda	-	1	6	7	.02	.16
G	Sitanion hystrix	$_{a}$-	$_{b}$22	$_{a}$1	$_{a}$-	.00	-
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		498	593	564	422	12.51	14.26
Total for Grasses		498	593	564	422	12.51	14.26
F	Alyssum alyssoides (a)	-	-	$_{b}$49	$_{a}$-	.09	-
F	Arabis spp.	5	2	-	3	-	.00
F	Astragalus marianus	3	5	-	1	-	.00
F	Castilleja chromosa	-	9	-	-	-	-
F	Carduus nutans (a)	1	2	-	-	-	-
F	Calochortus nuttallii	-	9	-	-	-	-
F	Chaenactis douglasii	$_{a}$-	$_{b}$13	$_{a}$1	$_{a}$1	.00	.00
F	Cirsium spp.	-	-	-	5	-	.04
F	Crepis acuminata	-	1	-	-	-	-
F	Cryptantha spp.	$_{a}$7	$_{b}$30	$_{a}$9	$_{ab}$24	.04	.21
F	Cynoglossum officinale	-	3	3	-	.03	-
F	Erigeron pumilus	-	3	-	-	-	-
F	Eriogonum umbellatum	11	-	6	-	.01	-
F	Gilia spp. (a)	$_{a}$1	$_{b}$30	$_{a}$3	$_{a}$-	.01	-
F	Lepidium spp. (a)	-	-	$_{a}$-	$_{b}$96	-	.33
F	Lomatium spp.	-	2	-	-	-	-
F	Medicago sativa	-	-	7	-	.53	-
F	Penstemon humilis	-	-	-	2	-	.00
F	Penstemon pachyphyllus	$_{ab}$3	$_{b}$9	$_{a}$-	$_{a}$-	-	-

Type	Species	Nested Frequency				Average Cover %	
		'85	'91	'99	'04	'99	'04
F	Physaria acutifolia	$_{a}$-	$_{b}$36	$_{b}$12	$_{b}$14	.06	.04
F	Phlox austromontana	19	23	11	15	.05	.16
F	Ranunculus testiculatus (a)	-	-	-	4	-	.01
F	Senecio multilobatus	$_{a}$-	$_{b}$12	$_{a}$-	$_{a}$-	-	-
F	Taraxacum officinale	-	4	-	-	-	-
F	Tragopogon dubius	4	-	3	1	.01	.00
F	Unknown forb-perennial	-	3	-	-	-	-
Total for Annual Forbs		2	32	52	100	0.10	0.33
Total for Perennial Forbs		52	164	52	66	0.75	0.50
Total for Forbs		54	196	104	166	0.86	0.84

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --
Management unit 16C, Study no: 40

Type	Species	Strip Frequency		Average Cover %	
		'99	'04	'99	'04
B	Artemisia nova	1	4	-	.01
B	Juniperus osteosperma	11	6	2.36	1.94
B	Pinus edulis	2	3	1.87	3.82
B	Quercus gambelii	1	0	-	-
Total for Browse		15	13	4.24	5.77

CANOPY COVER, LINE INTERCEPT --
Management unit 16C, Study no: 40

Species	Percent Cover	
	'99	'04
Juniperus osteosperma	1.39	7.58
Pinus edulis	-	2.75

POINT-QUARTER TREE DATA --
Management unit 16C, Study no: 40

Species	Trees per Acre	
	'99	'04
Juniperus osteosperma	90	84
Pinus edulis	44	46

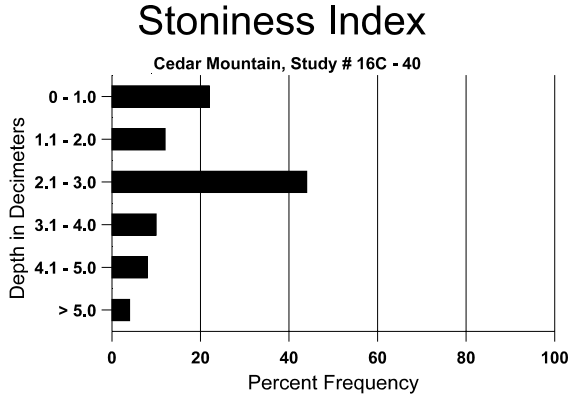
Average diameter (in)	
'99	'04
4.8	4.5
3.7	3.4

BASIC COVER --
Management unit 16C, Study no: 40

Cover Type	Average Cover %			
	'85	'91	'99	'04
Vegetation	7.25	7.25	22.26	20.77
Rock	5.50	6.75	6.38	9.62
Pavement	9.25	6.75	6.41	13.06
Litter	63.25	61.00	49.76	37.80
Cryptogams	.25	0	.19	.03
Bare Ground	14.50	18.25	9.80	32.28

SOIL ANALYSIS DATA --
Management unit 16C, Study no: 40, Study Name: Cedar Mountain

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
14.2	57.3 (12.5)	n/a	31.3	32.2	36.6	5.4	5.1	217.6	0.7



PELLET GROUP DATA --
Management unit 16C, Study no: 40

Type	Quadrat Frequency		Days use per acre (ha)	
	'99	'04	'99	'04
Rabbit	27	62	-	-
Elk	15	40	34 (84)	37 (93)
Deer	18	4	10 (25)	4 (10)
Cattle	1	-	-	-

BROWSE CHARACTERISTICS --
Management unit 16C, Study no: 40

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia nova												
85	**0**	-	-	-	-	-	0	0	0	-	0	-/-
91	**0**	-	-	-	-	-	0	0	0	-	0	-/-
99	**60**	20	20	40	-	-	0	0	0	-	0	6/14
04	**120**	-	-	40	80	-	67	0	67	-	0	13/31
Artemisia tridentata vaseyana												
85	**0**	-	-	-	-	-	0	0	-	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	20	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	11/10
Chrysothamnus viscidiflorus												
85	**0**	-	-	-	-	-	0	0	-	-	0	-/-
91	**66**	-	-	66	-	-	0	0	-	-	0	9/11
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Juniperus osteosperma												
85	**132**	-	-	66	66	-	0	0	50	-	0	47/43
91	**132**	-	66	66	-	-	0	0	0	-	0	69/67
99	**300**	-	100	200	-	80	0	0	0	-	0	-/-
04	**120**	-	20	100	-	-	0	0	0	-	0	-/-
Pinus edulis												
85	**0**	-	-	-	-	-	0	0	-	-	0	-/-
91	**66**	-	66	-	-	-	0	0	-	-	0	-/-
99	**40**	-	20	20	-	20	0	0	-	-	0	-/-
04	**60**	-	20	40	-	-	0	0	-	-	0	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Quercus gambelii												
85	**0**	-	-	-	-	-	0	0	-	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**40**	-	40	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	42/13